SIEMENS

M1000/3000/3000 Nova

SP

Service

Installation Instructions

Dose Calculation System

Kit no. 66 16 002

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English
Print No.: SPB7-230.812.02.02.02
Doc. Gen. Date: 11.04
Replaces: SPB7-230.812.02.01.02
(66 08 082)

Chapter	Page	Revision
All	All	02

Document revision level

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General

This document describes the installation procedure of the Dose Calculation Option for MAMMOMAT 1000/3000/3000 Nova. This upgrade will display a calculated absorbed glandular dose value for each exposure.

Tools / documents required

- Service PC (e.g. Siemens Nixdorf PCD3-NSX/20 or similar) with connecting cable (PC - Generator), part no. 99 00 440 RE999
- Digital multimeter (e.g. "Fluke 8060A", part no. 97 02 101)
- Standard tool kit
- Electro-Static Discharge (ESD-proof) tools
- MAMMOMAT Wiring diagrams, SPB7-230.051.07...

Components included

Upgrade kit "Calculation of absorbed glandular dose" (Material no. 66 16 002) includes:

Pos. no.	Quantity	Part no.	Name
1	1	66 09 528	Floppy disk with Service PC Program, V4.4; (referred to as **new** Service Program floppy)
2	1	66 09 536	Floppy disk with Dose Calculation Program, V1.0;
3	1	66 09 544	Floppy disk with Label Configuring Program, V1.2;
4	2	60 01 486	Empty floppy disk
5	1	66 09 601	EPROM x 1, for the stand, Firmware V4.5;
6	1	66 09 619	EPROM x 3, for the generator, Firmware V4.5
7	1	66 07 993	mAs / mGy label
8	1	-	Supplements to the Instructions for use; SPB7-230.203.11
9	1	-	Radiographic Handbook; SPB7-230.206.01
10	1	-	Service Program document; SPB7-230.114.03
11	1	-	Printer configuration program document; SPB7-230.812.03
12	1	-	This document; SPB7-230.812.02

Optional measurements

If desired, measurements of HVL (Half-Value Layer) and Dose Exchange factors can be performed to improve the accuracy of displayed dose value. These measurements should be performed by the hospital's medical physicist, and are described in the document "Radiographic Handbook, Dose Calculation System". The measuring procedure is quite complicated, and should only be performed by a physicist familiar with similar measurements. Normally, the factory default values should be used. If the HVL and Dose Exchange values are to be measured, this document also describes how to calibrate the kV prior to the measurements, see Chapter 3.

Firmware prerequisites

- Firmware version 4.0 - 4.3

Time required

Approximately 2 - 3 hours for one Customer Support Engineer.

Safety information and protective measures

It is very important that any intervention in the equipment will start by disconnecting it from the power supply with the main circuit-breaker.

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit.

Life-threatening electric shock hazard exists.

The voltage level will be indicated by LED V24 on PC board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.

⚠CAUTION

The PC boards contain electrostatically highly sensitive components requiring particular care in their handling.

Risk of damaging the components.

Follow ESD guidelines.

This symbol indicates exposure of X-ray radiation.

Backup of existing system

1. Mains voltage and system OFF.
2. Open the generator by removing the front cover as follows: Pry loose the plastic strips (pos. 1 / Fig. 1) on both sides, using a screwdriver or similar tool. Loosen the sixteen screws (pos. 2 / Fig. 1) now accessible (eight on either side) and remove the front cover (pos. 3 / Fig. 1).

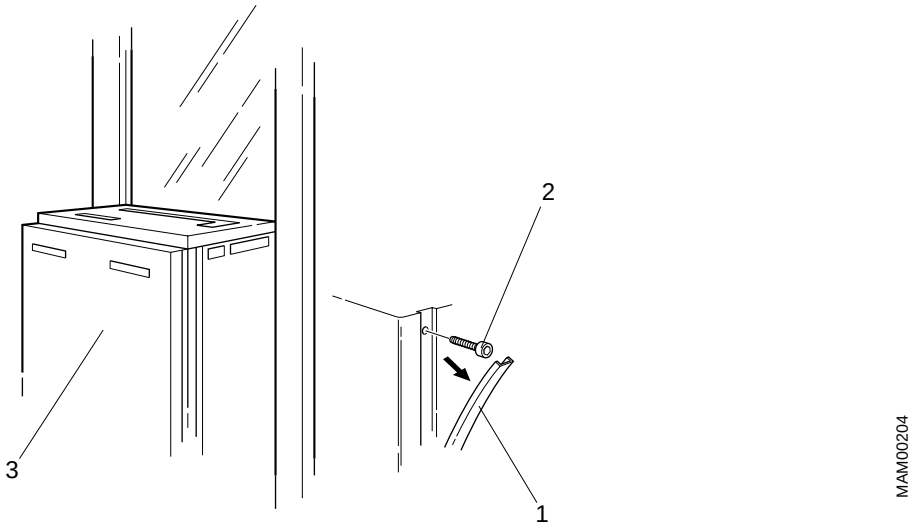

Fig. 1 Opening of the generator

NOTE	**Be sure to keep the contact washers (there are four contact washers on either side). They will be needed again when reassembling the front cover, to establish protective ground connection.**

3. Connect the service PC to the generator.
4. Mains voltage and system ON.
5. Start up the old Service PC program as follows:

   - Insert the old Service PC floppy.
   - Start the Service program from DOS-environment.
   - In the log in-menu, enter your name and press <ENTER>.
   - Type the password for the Service PC program and press <ENTER>.
   - In Program-mode set: **normal**.

6. Check that the correct version of the Service PC program is used. The version is shown in the top left corner of the display.
7. In <Mainmenu> select <Configuration> and <Power>. Note the displayed power values in the test protocol on Page T - 1.
8. Take out the floppy with the old Service PC program and insert an empty floppy disk and mark it with ***old backup***, serial number of system, version of service program, and date. This floppy is defined as ***old backup floppy***.
9. In <Mainmenu> select <Backup>, <Copy installation to floppy> and <All>.

10. In <Mainmenu> select <Configuration>, <Save config file>. Press <F2> to save.
11. In <Mainmenu> select <Service>, <Copy error buffer to file>.
12. If the MAMMOMAT is equipped with OPDOSE, press program button 1 on the control panel. Note the displayed exposure settings in the test protocol on Page T - 1. Repeat for all four programs. Enter menu <Configuration>, <Miscellaneous> and <Auto limits>. Note the three values in test protocol T - 1.
13. Quit the Service program by pressing <F10>.
14. Check that the following backup files are stored on the floppy disk (by typing "a:", then pressing <ENTER> and typing "dir"):

    - a_backup.txt for AEC parameters
    - s_backup.txt for stand parameters
    - p_backup.txt for panel parameters
    - momo_h.txt for AEC correction tables
    - morh_h.txt for AEC correction tables
    - wrh_h.txt for AEC correction tables
    - momo_d.txt for AEC correction tables
    - morh_d.txt for AEC correction tables
    - wrh_d.txt for AEC correction tables
    - mammo.cfg for configuration parameters
15. Remove the floppy disk and make it write protected.
16. Mains voltage and system OFF.

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit.

Life-threatening electric shock hazard exists.

The voltage level will be indicated by LED V24 on PC board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.

Change of EPROMs

1. Mains voltage and system OFF.
2. Exchange the four following EPROMs:

NOTE	**Make sure that the PROM is positioned with its semi-circular mark in the same direction as the mark on the actual PC board. Use ESD tools.**

⇨ **Control Panel, I 10** on circuit board D740, see wiring diagram, Page 5-10. To have access to circuit board D740, the shielding grid cover should be removed. Loosen the screws on the side holding the grid cover. Remove the grid cover. In cases with a separate control console remove the larger cover in the bottom of the control panel to gain access to the EPROM.

⇨ **Master, J 39** on circuit board D702, Master PC board, see Wiring diagram, Pages 5-5 and 6-1.

⇨ **AEC, IC 7** on circuit board D701.

⇨ **Stand, I 9** on the CPU board D801, see Wiring diagram, (Stand). To have access to CPU board D801, the right side cover (or the complete back cover) should be removed. Loosen the screw (pos. 1 / Fig. 2) at the top of the stand. Pry loose the plastic strip (pos. 2 / Fig. 2), using a screwdriver or similar tool. Loosen the screws (pos. 3 / Fig. 2) now accessible and remove the cover (pos. 4 / Fig. 2).

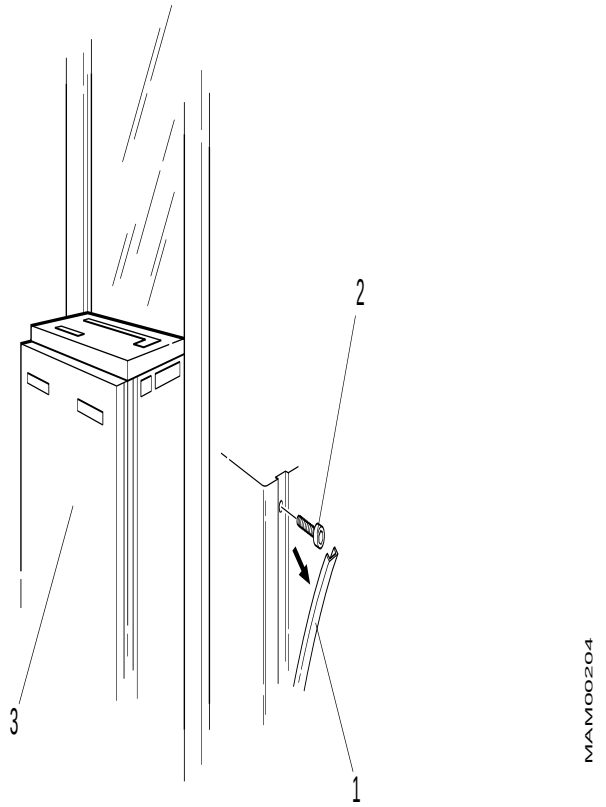

Fig. 2 Removal of right side cover

3. Mains voltage and system ON.
4. An error may now be displayed on the control panel due to the new PROM version. Acknowledge any error by pressing the "lim" button on the control panel. Error 105 may / will be displayed until "Enable / Disable Dose Calculation" is performed.

Firmware configuration

1. Start up the **old** Service PC program. A question may appear asking for system type and if the MAMMOMAT is a model M1000 also type of collimator. Select correct settings and save with <F2>.

⚠CAUTION **Be sure to use the old Service PC program.**

The new program will load incorrect values that might damage the X-ray tube.

2. Take out the old Service PC floppy disk and insert the ***old backup floppy*** disk.
3. In <Mainmenu> select <Backup>, <Copy floppy to installation area> for <Panel> only. Press <Enter> after the selection to send the backup data.
4. Quit the old Service Program by pressing <F10>.
5. Start up the **new** Service PC program, enter menu <Configuration>, <System type>. Make sure the System type as well as the Collimator type shown are the correct ones, select correct settings, if necessary. Press <F2> to save.
6. Acknowledge any errors by pressing the "lim" button on the control panel.
7. In <Mainmenu> select <Configuration> and <Power>. Check that the power values are the same as noted in the Test protocol.
8. Quit the **new** Service Program.
9. Remove the new Service Program floppy and insert the Dose Calculation Program floppy. (These few steps will load the factory values for the HVL, else the ERR014 may appear. For ERR description see the document SPB7-230.114.03...).
10. Start up the Dose Calculation Program.The username/login-account and password is the same as for the Service Program.
11. In <Mainmenu> select <Enable/Disable Dose Calculation> and use <space> to toggle between ON/OFF. Set to desired status. (The factory set default may be <Disabled>, set to <Enabled>.)
12. In <Mainmenu> select <Configure Tube-specific parameters> and <Factory defaults>. Press <F2> to install default parameters.
13. Quit the Dose Calculation Program.
14. Acknowledge any errors by pressing the "lim" button on the control panel.

15. Mount an object table and check the exposure release by making an "mAs"-exposure. Check that it is a normal exposure without any errors. If error occurs, troubleshoot according to standard procedures.

16. Check, that the motorized movements function properly, See Installation and Start-up Instruction, SPB7-230.033....
17. Remove the Dose Calculation Program floppy and insert the new Service Program floppy.
18. Start the new Service PC Program.
19. Remove the Service Program floppy and insert an empty floppy disk.
20. In <Mainmenu> select <Backup>, <Copy installation area to floppy> and <All>.
21. Remove the floppy disk and label it with new backup, serial no. of system, version of Service Program and date.
22. Quit the Service Program.

Printer configuration

If a printer is connected to the MAMMOMAT, it can be configured to show the calculated dose value on print, as well. Information on how to configure the printer settings is in the document SPB7-230.812.03..., included in this kit.

Patient data flasher configuration

If a flasher is connected to the MAMMOMAT, it can be configured to flash the dose value, as well. Consult the documentation found on the intranet in the section "Network ID Camera", found under "Product Information > SP Systems > Mammo / Mobiles > Mammography".

Reassembly

1. Switch the system and the mains voltage OFF.
2. Remount the back cover and/or the right side cover of the stand (see Fig. 2).
3. Reinstall the shielding grid cover below the D740 - Control panel board.
4. Remount the front cover of the generator cabinet (pos. 3 / Fig. 1).
5. Affix the **mAs / mGy** label over (actually covering) the "mAs" text on the control and display panel. The hitherto usual display of the post-exposure mAs value will be now interrupted by occasional display of the calculated absorbed glandular dose value, given in milliGray / mG. (Alternating display.)

Installation of measured values

If the hospital's medical physicist has measured the HVL (Half Value Layer) and the Dose Exchange data according to the information in the document "Radiographic Handbook, Dose Calculation System", these values can be installed as follows:

1. Open the generator according to step 1. to 4. on Page 2 - 1.
2. Insert the Dose Calculation Program floppy and run the program.

3. In <Mainmenu> select <Configure tube specific parameters>, <HVL values> and enter the measured values. Press <F2> to save.

NOTICE

If the Dose Calculation Program does not accept the entered values, the measured values are faulty - out of range!

Repeat the measure procedure or install factory default parameters.

4. In <Mainmenu> select <Configure tube specific parameters>, <Dose exchange factors> and enter the measured values. Press <F2> to save.
5. Quit the Dose Calculation Program.

6. Mount an object table and check the exposure release by making an mAs exposure. Check that it is a normal exposure without any errors. If error occurs, troubleshoot according to standard procedures.
7. Remove the Dose Calculation Program floppy and insert the new Service Program floppy.
8. Start the new Service PC Program.
9. Remove the Service Program floppy and insert an empty floppy disk.
10. In <Mainmenu> select <Backup>, <Copy installation area to floppy> and <All>.
11. Remove the floppy disk and label it with new backup, serial no. of system, version of Service Program and date.
12. Quit the Service Program.
13. Follow the instructions in the section "Reassembly" on Page 2 - 5.

General

The dose calculation option uses measurements and source table data to calculate the absorbed glandular dose. Values that can be measured are the HVL value (Half Value Layer) and the Dose Exchange value. To improve the measured values, the kV can be calibrated first.

Calibration of kV

For proper measuring, check, and if necessary calibrate, the kV as follows:

1. Mains voltage and system OFF.

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit.

Life-threatening electric shock hazard exists.

The voltage level will be indicated by LED V24 on PC board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.

2. Open the generator by removing the front cover as follows: Pry loose the plastic strips (pos. 1 / Fig. 1) on both sides, using a screwdriver or similar tool. Loosen the sixteen screws (pos. 2 / Fig. 1) now accessible (eight on either side) and remove the front cover (pos. 3 / Fig. 1).

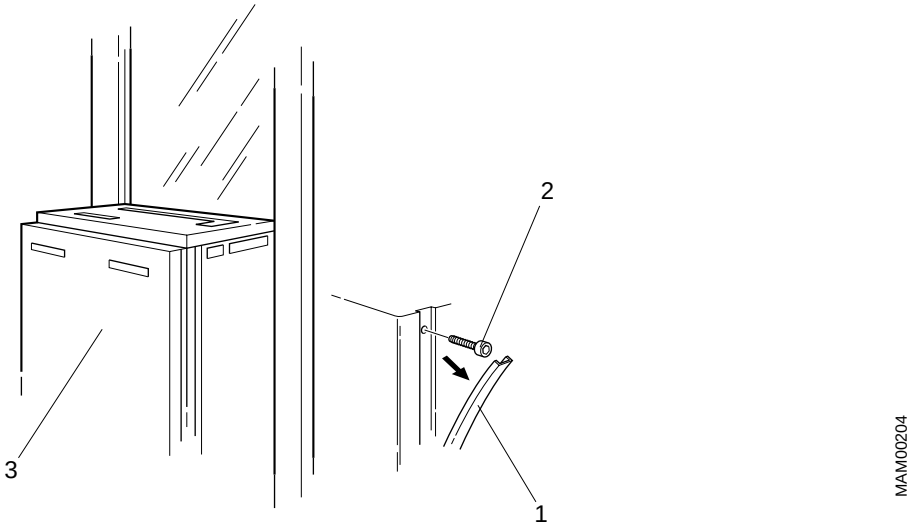

Fig. 1 Opening of the generator

NOTE

Be sure to keep the contact washers (there are four contact washers on either side). They will be needed again when reassembling the front cover, to establish protective ground connection.

3. Connect a Digital Volt Meter (DVM) between the lower ends of R72 and R73 (on the left side of the high tension plug) on D710 circuit board.

4. Mains voltage and system ON.
5. Set 27 kV and maximum mAs on the control panel.
6. Release an exposure and check that the DVM shows 2.700 ±0.010 V.
7. If necessary, adjust R43 on D702 (Fig. 2) and repeat from step 6.

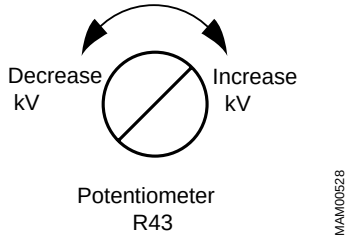

Fig. 2 Calibration potentiometer

NOTE

Do not overload the X-ray tube by making too many exposures in a short time.

R43 does not need to be relocked with locking paint.

Backup of existing system

These forms are used for system backup.

Anode	Power (kW)
Large focus molly	
Large focus tungsten	
Small focus molly	
Small focus tungsten	

Program buttons	kV	Density correction	Speed button (H or D)	Anode/Filter combination

Auto limits	
Program 1	
Program 2	
Program 3	

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Chapter 1:	Actualize of material numbers.

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